



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

About 5 or 6 paces farther from the place where the sheep were lying, towards the north-west the ground was much torn up as if plough'd, and an oblique hole made of about three feet deep.

The breadths of the different holes were from six to three inches.

LIII. *A Letter from Mr. James Dodson to Mr. John Robertson, F. R. S. concerning an Improvement of the Bills of Mortality.*

S I R,

January 13, 1752.

Read Jan. 16,
1752.

AS there has lately been a scheme proposed for amending the form of the bills of mortality of London, in a pamphlet called *Observations on the past growth and present state of London*, by Mr. Corbyn Morris, the ingenious author of which has enumerated many excellent purposes, to which it may be applied, but has omitted to mention that of giving a greater degree of certainty to the calculations of the values of annuities on lives; a benefit too considerable to be passed by silently: And as your knowlege of that subject will enable you to judge of what is fit to be done, in order to obtain so desirable an advantage; I beg leave to trouble you with my thoughts concerning a farther regulation of those bills, which, I presume, may be conducive thereto.

The present possessors of intailed estates are, in common law, justly called tenants for life. Marriage-

riage-settlements, generally, convey the reversion of a considerable part of the bridegroom's estate to the bride, for her natural life after his decease; to which two things all the freehold estates in these kingdoms are liable: and if to these be added the great number of copyholds, determinable on lives; the great quantities of church, college, and other lands, leased on lives, and the estates possessed by ecclesiastical persons of all degrees; we shall find, that the values of the possessions and reversions, of much the greatest part, of the real estates in these kingdoms, will, one way or other, depend on the value of lives. Likewise the incomes annexed to all places, civil and military, all pensions, and most charitable donations, are annuities for life. The interest or dividends of many personalities in the stocks have been, by the wills of their possessors, render'd of the same kind; besides which, there are some annuities on lives, which have been granted by the government, and have parliamentary security for their payment; and others, that have been granted by parishes, in consequence of acts of parliament made for that purpose.

After this summary view of the extensive property, that is vested in annuities on lives, it would be very easy to name a great variety of circumstances, in which the computations of the values of one, two, or more lives, will become necessary to those persons, who do not chuse to have their property determined by customs, which seem to have been established merely for want of good methods of calculation. But I know to whom I am addressing,
and

and shall therefore forbear to exemplify on a subject, with which you are so well acquainted.

The advantages attending the determination of those things, by calculation, rather than by custom, being therefore considered as evident, it may seem strange, that, notwithstanding many of these tenures have subsisted from the very origin of private property in these kingdoms, yet we do not meet with so much as an attempt towards computing their values, till that of the late justly celebrated Dr. Halley, by the assistance of the bills of mortality of Breslaw in Silesia, which was soon followed by Mr. De Moivre's truly admirable hypothesis, that the decrements of life may be esteemed nearly equal, after a certain age.

It has been the opinion of some authors, that, since his hypothesis was originally derived from the Breslaw observations, it cannot be near so well adapted to the inhabitants of these kingdoms, as what has been derived from the bills of mortality of London. But this argument doth not, as I conceive, appear to be conclusive; first,

Because those bills, as hitherto kept, are not well adapted to answer this purpose.

Secondly, Because the manner, in which the inhabitants of London, and those of most of the country towns and villages, live, their occupations, diet, and diversions, nay the very air they breathe, are as different, as those of London, and Breslaw, can possibly be; and, consequently, so must the times of their dissolution. All which has been, with a great deal of clearness, evinced by the gentleman above quoted.

Thirdly,

Thirdly, because those persons, who suppose, that Mr. De Moivre's hypothesis has its foundation, peculiarly, in the Breslaw observations, are greatly mistaken: for, having lately been endeavouring to discover some farther helps to the speedy valuation of lives, I have found, that, on the contrary, if the London observations had been then in Mr. De Moivre's hands, he might, as justly, have derived his hypothesis therefrom; which will appear from his own words, in the preface to his treatise of *Annuities on Lives*, compared with the London observations.

“ Two or three years after the publication of the
 “ first edition of my *Doctrine of Chances* (says that
 “ excellent mathematician) I took the subject into
 “ consideration; and consulting Dr. Halley's table of
 “ observations, I found, that the decrements of life,
 “ for considerable intervals of time, were in arithmetic
 “ progression: for instance, out of 646 persons of 12
 “ years of age, there remain 640, after one year:
 “ 634, after two years; 628, 622, 616, 610, 604,
 “ 598, 592, 586, after 3, 4, 5, 6, 7, 8, 9, 10
 “ years respectively; the common difference of those
 “ numbers being 6. Examining afterwards other
 “ cases, I found, that the decrements of life, for
 “ several years, were still in arithmetic progression,
 “ which may be observed from the age of 54 to the
 “ age of 71, where the difference, for 17 years to-
 “ gether, is constantly 10. After having tho-
 “ roughly examined the tables of observations, and
 “ discover'd that property of the decrements of life,
 “ I was inclined to compose a table of the values of
 “ annuities on lives, by keeping close to the tables
 “ of observation; which would have been done
 “ with

“ with ease, by taking, in the whole extent of life,
 “ several intervals, whether equal or unequal. How-
 “ ever, before I undertook the task, I tried what
 “ would be the result of supposing those decre-
 “ ments uniform from the age of twelve; being
 “ satisfied, that the excesses on one side would be
 “ nearly compensated by the defects on the other :
 “ then, comparing my calculation, with that of Dr.
 “ Halley, I found the conclusion so very different,
 “ that I thought it superfluous to join together several
 “ different rules, in order to compose a single one.”

Now the same thing, which Mr. De Moivre mentions above, happens in the table of the London observations; *viz.* out of 510 persons, of 12 years of age, there remain 504, after one year; 498, after two years; 492, 486, 480, 474, 468, 462, after 3, 4, 5, 6, 7, and 8 years respectively; the common difference being 6; and the like happens in other instances, to be met with in the London observations, as published by different authors. Add to this, that, having calculated the value of an annuity on a life of 10 years of age, by both tables, and also by the hypothesis, I find it to turn out thus,

	Years Purchase.
By the Breslaw tables of observations	17,7237
By supposing the decrements of life equal	16,8814
By the London tables of observations	16,3907

From which there seems to be some reason to conclude, that the hypothesis (as it gives an answer less than the Breslaw, and greater than the London observations) may be the best method of the three; And it is farther remarkable, that the result, by the

U u

hypothesis,

hypothesis, is nearer to that by the London, than to that by the Breslaw observations.

However, if the argument for using the London observations has any force at all, the computation of the value of each person's life must be made from observations, drawn from the bills of mortality, kept at the place of his or her residence: and therefore it is, that I at present trouble you, in order to contribute, as much as I can, to there being a sufficient number of good bills of mortality.

There seems to be an objection, both to the hypothesis, and to the observations; for it is well known, that the fair sex (especially at two periods of their life) are obnoxious to fatal disorders, not incident to the other sex, nor distinguished in the present bills of mortality; and, consequently, neither the tables of observations, nor the hypothesis (which is derived from them) will render the calculations of the values of lives sufficiently certain; unless there be a periodical distinction of sexes in those bills: as it would probably appear, if such a distinction had been introduced, that there is a wide difference between the values of a male and female life of the same age.

But there will be a great inconvenience, in rejecting the hypothesis, which none of these gentlemen have remedied; I mean the prolix and laborious computation hitherto directed for the finding the values of lives from tables of observations: whereas, by the hypothesis (as its author justly observes) more can be concluded in a quarter of an hour, than can be performed in a quarter of a year, by any method, which the others have demonstrated. Whence it may be presumed, that the hypothesis will continue

to be used, until better methods are substituted in the place of those derived from it.

When the bills of mortality, digested into a proper form, shall have been kept a convenient time in every city or considerable town, and also in every hundred, or other proper division, of the country (and this I should be glad to see done) then, and not till then, the hypothesis may be tried by the facts, that will appear from the bills, and be confirmed or rejected accordingly.

Indeed (for my own part) I am almost persuaded, from what has been above remarked, that the hypothesis will, in general, appear to be the nearer the truth, the more those bills of mortality shall be in number, and the correcter they are kept. I shall proceed, therefore, to mention those alterations, which, I think, may be of advantage, in the form of the bills of mortality, in every part of these kingdoms, over and above those mentioned by Mr. Morris, in the before-quoted pamphlet.

1. That there be a distinction made, upon the face of the bills of mortality, between the persons who were born in the place where such bills were kept, and those that were not. This will be effected with a very little trouble, if the searchers of each parish be instructed to ask the question of the friends of the deceased, and annex the answer to their report. This precaution will facilitate many of the good purposes proposed by Mr. Morris; and, in particular, with regard to the fixing the values of lives, it will enable the persons, who shall apply the bills to calculation, to draw their conclusions only from the lives, that were both begun, and ended, in or

near the same place; the want of the possibility of doing which is the principal objection to the London bills, as hitherto kept.

2. That there be a distinction, with regard both to age and disease, made upon the face of the bills, between the sexes; and that one case be added to the list of diseases; *viz.* complaints peculiarly incident to the female sex. This will not only solve the difficulty above started, but also answer many purposes in political arithmetic, as well as to the sagacious physician.

3. That a farther division be made in time; for whereas Mr. Morris's scheme exhibits no age between 40 and 50, I would propose, that the numbers dying between 40 and 45, and between 45 and 50, should be particularized in the bills; the design of this being to fix the periods, that are fatal to the fair sex, with more certainty.

These alterations, together with those proposed by Mr. Morris, being made, the yearly bill of mortality, for London, will appear as in the specimen annexed.

Now, Sir, if you shall, upon considering what I have offered, be of opinion, that the above regulations are worthy notice, your approbation will be a sufficient justification of my desire, that they may be made more public, in such manner as you shall think fit. I am, Sir,

Your most humble servant,

James Dodson.

*A GENERAL BILL of the WEDDINGS, BIRTHS, and BURIALS
of London (distinguishing which w*

[illegible]

RIALS; and also of the Numbers, which have died of each Age, Sex, and Disease, which were Natives thereof) for the Year ending December the 31st 1750.

Total Number of BURIALS.

Whereof have died of the following Ages and Sex :

[illegible]

fease, within the City and Suburbs

[illegible]

[illegible]

Total Number of BIRTHS —————

[illegible]

Total Number of WEDDINGS — —

Total N:

Sickened of the Small-Pox	Inoculated		Not Inoculated
	Recovered	Not Recovered	
1	1	0	1
2	2	0	2
3	3	0	3
4	4	0	4
5	5	0	5
6	6	0	6
7	7	0	7
8	8	0	8
9	9	0	9
10	10	0	10
11	11	0	11
12	12	0	12
13	13	0	13
14	14	0	14
15	15	0	15
16	16	0	16
17	17	0	17
18	18	0	18
19	19	0	19
20	20	0	20
21	21	0	21
22	22	0	22
23	23	0	23
24	24	0	24
25	25	0	25
26	26	0	26
27	27	0	27
28	28	0	28
29	29	0	29
30	30	0	30
31	31	0	31
32	32	0	32
33	33	0	33
34	34	0	34
35	35	0	35
36	36	0	36
37	37	0	37
38	38	0	38
39	39	0	39
40	40	0	40
41	41	0	41
42	42	0	42
43	43	0	43
44	44	0	44
45	45	0	45
46	46	0	46
47	47	0	47
48	48	0	48
49	49	0	49
50	50	0	50
51	51	0	51
52	52	0	52
53	53	0	53
54	54	0	54
55	55	0	55
56	56	0	56
57	57	0	57
58	58	0	58
59	59	0	59
60	60	0	60
61	61	0	61
62	62	0	62
63	63	0	63
64	64	0	64
65	65	0	65
66	66	0	66
67	67	0	67
68	68	0	68
69	69	0	69
70	70	0	70
71	71	0	71
72	72	0	72
73	73	0	73
74	74	0	74
75	75	0	75
76	76	0	76
77	77	0	77
78	78	0	78
79	79	0	79
80	80	0	80
81	81	0	81
82	82	0	82
83	83	0	83
84	84	0	84
85	85	0	85
86	86	0	86
87	87	0	87
88	88	0	88
89	89	0	89
90	90	0	90
91	91	0	91
92	92	0	92
93	93	0	93
94	94	0	94
95	95	0	95
96	96	0	96
97	97	0	97
98	98	0	98
99	99	0	99
100	100	0	100

Not Inoculated

Of which

FOUNDLINGS received —

[illegible]

Total Number of BURIALS —

Total Number of BURIALS	_____
Of which { Males	_____
{ Females	_____